

TUBERCULOSIS (TB)

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description:

When persons inhale TB organisms (tubercle bacilli) into their lungs, the organisms travel to the lung's alveoli, where the organisms are ingested by macrophages (a type of white blood cell). Infection begins with the multiplication of tubercle bacilli within the macrophages.

Latent TB infection (LTBI):

In most cases, the immune system contains the organism and prevents the development of disease. LTBI refers to individuals who are infected, but asymptomatic and not infectious. They will probably have a positive reaction to either the tuberculin skin test (TST) or a FDA approved in-vitro serologic test. (False negatives can be caused by immunosuppression or fulminant active disease.)

Currently, QuantiFERON –TB Gold In-Tube (QFT-GIT) and T-Spot are the only FDA approved in-vitro serologic tests available in the United States. These tests (Interferon Gamma Release Assay [IGRA]) detect the release of interferon-gamma in fresh heparinized whole blood from sensitized persons when it is incubated with mixtures of synthetic peptides representing two proteins present in *M. tuberculosis*. The Centers for Disease Control and Prevention (CDC) recommends that these tests may be used in all circumstances in which the TST is currently used, including contact investigations, evaluation of recent immigrants, and sequential-testing surveillance programs for infection control. Due to the lack of sufficient study data, the American Academy of Pediatrics does not recommend using these assays routinely in children <5, or immunocompromised children of any age.

Chest radiographs may be used to rule out the possibility of pulmonary tuberculosis in a person who has a positive reaction to either the TST or an IGRA and no symptoms of disease.

As long as the immune system remains vigorous, TB stays dormant, walled up in small structures created by the immune system (granuloma). While the majority of individuals will not go on to develop active TB disease, about 10% of infected and not adequately treated people will develop active tuberculosis at some time in their life. The risk is considerably higher for persons who are aged or immunosuppressed, especially those with Human Immunodeficiency Virus (HIV) infection.

Active TB disease (ATBD):

Active TB occurs when these dormant or latent TB organisms begin to multiply in a person. It is infectious when pulmonary or aerosolized.

General symptoms of TB disease include unexplained fever, fatigue, weight loss, and night sweats. TB can affect any part of the body, but most often (~80%) affects the lungs.

Pulmonary TB: Signs and symptoms specific to pulmonary TB include cough (progressing from nonproductive to productive); in advanced stages, blood-tinged sputum (hemoptysis); and an abnormal chest radiograph, progressing from infiltrates to open cavities as the disease advances untreated.

Extra-pulmonary TB: Typical extrapulmonary manifestations of TB include hepatic, meningitis, pericarditis, skeletal, genitourinary, gastrointestinal, lymphadenitis, cutaneous, and other miscellaneous sites.

Causative Agent:

TB is caused by bacteria (tubercle bacilli) that make up the *Mycobacterium tuberculosis* complex. There are eight closely related organisms in the complex: *M. tuberculosis* (*M. tb*), *M. bovis*, *M. africanum*, *M. microti*, *M. caprae*, *M. pinnipedii*, *M. canetti*, and *M. mungi*. Most of the cases in the U.S. are caused by *M. tb*. There are other species in the *Mycobacteria* genus known as *Mycobacteria* other than TB or MOTT. (Infection with a MOTT may possibly, but not likely, cause a false positive TST; even less likely a false positive IGRA.) *Mycobacterium avium* complex is the most common. MOTT are not considered to be of importance to public health, with the exception of *M. leprae* (the cause of leprosy).

Mycobacteria are distinguishable by the fact that their cell walls are resistant to acid, thus the term acid-fast bacilli or AFB. Different *Mycobacteria* grow at different rates, with the *M. tb* complex being among the slower growers (typically several weeks, up to 6-8 weeks).

Differential Diagnosis:

The differential diagnosis for pulmonary TB include lung cancer, community acquired pneumonia, lung abscess, and coccidioidomycosis.

Laboratory identification:

Detection of acid-fast bacilli (AFB) in stained smears examined microscopically may provide the first bacteriologic clue of tuberculosis. Smear examination is an easy and quick procedure; results should be available within 24 hours of specimen receipt by the lab. Specimens should be refrigerated (not frozen) and sent to the lab ASAP, and should not be received by the lab more than 7 days post collection. Collect 3 samples 8 - 24 hours apart, with at least one being an early morning sample. However, smear examination permits only the presumptive diagnosis of tuberculosis because the AFB in a smear may be *mycobacteria* other than *M. tuberculosis*. Furthermore, many tuberculosis patients have negative AFB smears.

Laboratory confirmation of TB infection is generally accomplished via culture and nucleic acid testing. Culture is highly sensitive and specific, however the organisms are slow to grow and isolation and identification can take weeks. Nucleic acid amplification can be performed directly on smears and, if positive, can reduce the time for confirmation to hours.

For all patients, the initial *M. tuberculosis* isolate should be tested for drug resistance. Drug susceptibility patterns should be repeated for patients who do not respond adequately to treatment or who have positive culture results despite two months of therapy.

Treatment:

The typical treatment regimen begins with an eight-week initial phase of isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB) followed by a continuation phase of INH and RIF for an additional 4 months. However, the treatment regimen may be altered, depending on drug susceptibility results, patient HIV status, etc. Clinicians should consult with an infectious disease specialist, pulmonologist, or the state nurse consultant for dosages and duration.

The CDC, the American Thoracic Society, and the Infectious Disease Society of America have also issued a joint statement on the treatment of tuberculosis:

American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America: Treatment of Tuberculosis

Am J. Respir Crit Care Med

Vol 167. pp 603-662, 2003

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5211a1.htm>

Adequate patient support, including directly observed therapy (DOT), is highly effective in achieving cure and is recommended for the treatment of tuberculosis disease worldwide. DOT is required by Utah Administrative Code R388-804.

Multidrug-resistant tuberculosis (MDR TB), which is defined as tuberculosis that is resistant to at least isoniazid and rifampin, presents difficult treatment problems. Treatment must be individualized and based on the patient's medication history and drug susceptibility results.

An increasing concern is TB that is highly resistant to antibiotic therapy. This is known as extensively drug resistant TB (XDR TB). XDR TB is resistant to the two primary antibiotics (INH and RIF), and to a secondary antibiotic class (fluoroquinolones) as well as to at least one of three injectable drugs (amikacin, kanamycin, or capreomycin.)

Case fatality:

Worldwide, TB remains one of the deadliest diseases. One-third of the world's population is infected with *M. tuberculosis*. The World Health Organization (WHO) estimates 9 million people develop TB disease and 2 million die from TB each year. Death rates in the U.S. are significantly lower, with about 5% of individuals with active disease dying from TB.

Reservoir:

Humans are the most common source of infection, but other mammals have been known to harbor the organism (e.g., monkeys, dogs). In some areas, diseased cattle, badgers, and swine are also infected. Human infection with *M. bovis*, the bovine tubercle bacillus, is still a problem in areas where the disease in cattle has not been controlled and where raw milk and milk products are consumed.

Transmission:

TB is transmitted from person to person through the air by droplet nuclei (small particles 1–5 micrometers in size), generated by persons with infectious TB. Droplet nuclei are produced when persons with pulmonary or laryngeal TB cough, sneeze, speak, or sing. Droplet nuclei also may

be aerosolized by procedures, such as sputum induction, bronchoscopy, suctioning, or vigorous wound irrigation. Except for rare circumstances, persons with TB disease outside the lungs (extrapulmonary) are not infectious. Infection occurs when persons with prolonged or repeated close exposure to an infectious person, i.e., shared air space, inhale the organisms.

Susceptibility:

The risk of infection with the tubercle bacillus is directly related to the degree of exposure and may be enhanced by genetic or other host factors. The first 12-24 months after infection constitute the most hazardous period for the development of clinical disease. The risk of developing disease is highest in children under five, lowest in later childhood, and high again among young adults, the very old and the immunosuppressed. Population groups not previously touched by tuberculosis appear to have greater susceptibility to new infection and disease. Reactivation of long-latent infections accounts for a large proportion of tuberculosis disease cases in older people. Once infected, susceptibility to tuberculosis disease is markedly increased by HIV infection and other forms of immunosuppression, being underweight or undernourished, having a debilitating disorder (i.e., chronic renal failure, some forms of cancer, silicosis, diabetes or gastrectomy), or substance abuse.

Incubation period:

The time from initial infection to a positive reaction to either the TST or an FDA approved IGRA is between 2-8 weeks. Approximately 10% of individuals who acquire LTBI and who do not take a course of preventive treatment will develop active TB disease. While the risk of progression to TB disease is greatest within the first two years after infection, latent infection may persist for a lifetime. HIV infection and other conditions that impair immunity increase the risk and may shorten the interval from infection to the development of TB disease. The risk of progression for persons co-infected with TB and HIV is 7–10% per year versus a lifetime risk of 5–10% otherwise. The risk of developing ATBD is also greater for children under five years of age. A positive TST or IGRA usually persists, regardless of treatment.

Period of communicability:

Usually only older children and adults with respiratory tract disease are infectious. Factors affecting the degree of infectiousness include: the number of bacilli expelled into the air, virulence of the organism, adequacy of ventilation, exposure of bacilli to sun or ultraviolet radiation, and opportunities for aerosolization through coughing, sneezing, talking, singing, or during procedures. Effective treatment usually reduces/eliminates communicability within 2-4 weeks, although TB bacteria may still be seen in or may grow from expectorated sputum or other sources. Persons should be considered possibly infectious until no further growth is observed. Virulence of the TB organism and susceptibility of the host also play a role in transmission. Medical conditions such as HIV infection, other immune system impairments, or malnutrition may increase one's risk of infection, if exposed.

Although transmission has been known to occur, young children are generally not infectious; but they should be evaluated for likelihood of infectiousness (productive cough lasting 3 weeks or more, or cavitation on CXR.)

Epidemiology:

The U.S. TB case rate has declined from the 1953 rate of 52.6/100,000 population to 3.6/100,000 population in 2010. The 11,182 TB cases reported to CDC for 2010 represented a 3.1% decrease from 2009 and a 58% decrease from 1992, when the number of cases and the case rate peaked during a resurgence in the United States. The resurgence of TB in the U.S. in the late 1980s and early 1990s was associated with the emergence of MDR TB and the HIV/AIDS epidemic. The overall decrease in cases in the last decade primarily reflects a decrease in the number of cases among U.S.-born persons, with substantial declines in all age groups.

Utah is a low-incidence TB state, with case rates less than one-third of the national rate. From 2006 to 2010, Utah reported an average annual case rate of 1.1 per 100,000 persons. Twenty cases of active TB disease were reported in Utah in 2010, the lowest case count since TB has been reported; and during the five-year period from 2006 to 2010, Utah reported an average of 31 cases of TB per year. From 2006 to 2010, foreign-born persons accounted for 68% of TB cases.

PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Assure that appropriate treatment regimens are prescribed and that directly observed therapy is provided to reduce the occurrence of drug resistance.
- Ensure that contact investigations are conducted on all TB cases.
- Ensure that contacts to sputum AFB smear-positive cases with newly-diagnosed LTBI start and complete LTBI treatment.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify clusters or outbreaks of this disease.
- Identify sources of exposure and stop further transmission.

Prevention:

There are few preventive measures that individuals can take to protect themselves from exposure to TB.

Public health plays a major role in preventing new cases among uninfected individuals. It is essential that public health promptly identify, diagnose, and treat potentially infectious patients with tuberculosis disease. The best prevention for TB disease is to effectively control all diseased individuals and prevent further transmission.

Chemoprophylaxis:

Individuals with LTBI may receive 6-9 months of INH prophylaxis (possibly with pyridoxine) or 4-6 months of rifampin. In addition, CDC has recently approved a once weekly x 12 weeks regimen of INH and Rifapentine. This regimen requires DOT, and is only recommended for otherwise healthy people age 12 and older who have had recent exposure to an infectious patient, are recent TST or IGRA converters, or those with radiographic evidence of healed, pulmonary

TB. HIV+ individuals who are otherwise healthy and not on antiretrovirals may also be considered. The decision to test represents a decision to treat to completion of therapy.

The following groups should receive chemoprophylaxis regardless of age:

- ≥ 5 mm of induration TST, or IGRA+: HIV+; close contact of TB case; fibrosis on chest X ray; or immunosuppressed
- ≥ 10 mm of induration TST, or IGRA+: recent immigrant; injecting drug user; resident/employee of prison, jail, nursing home, hospital, shelter; diabetes mellitus, renal failure, leukemia/lymphoma, weight loss, gastrectomy; child < 5 years old
- Anyone with ≥ 10 mm increase in TST induration within 2 years or with ≥ 15 mm of induration; or conversion from a negative to positive IGRA.

[Information on treatment](#)

Vaccine:

Vaccination with the bacilli Calmette-Guerin (BCG) is not generally recommended in the United States because of the low risk of infection with *M. tuberculosis*, the variable effectiveness of the BCG vaccine against pulmonary tuberculosis, and the vaccine's interference with the ability to determine tuberculin reactivity (may cause a false positive TST).

Tuberculin skin testing is not contraindicated for persons who have been vaccinated with BCG, and the skin-test results of such persons are used to support or exclude the diagnosis of *M. tuberculosis* infection. A diagnosis of LTBI should be considered for any BCG-vaccinated person who has a TST reaction of ≥ 10 mm of induration. BCG-vaccinated persons who are HIV+ (or would otherwise be considered TST+ at ≥ 5 mm) and have a TST > 5 mm of induration should be considered for LTBI treatment.

An IGRA is a reasonable alternative for persons who have been vaccinated with BCG, as the proteins used in this test are absent from all BCG vaccine strains.

Isolation and quarantine requirements:

Isolation: In general, patients are isolated until they have completed at least 2 weeks of adequate therapy, show clinical improvement, and have three consecutive negative AFB sputum smear results collected in 8-24 hour intervals with at least one specimen being an early morning specimen. Public health pursues involuntary isolation orders for non-compliant patients.

Hospital: AFB precautions include placement in an airborne infection isolation room, appropriate signage, entry limited to those wearing N-95 respirators, and masking patients if they have to leave their room.

Quarantine: None

Public Health shall determine whether an infectious patient must remain hospitalized until non-infectious. This is based on the patient's living conditions, e.g. risk of exposure to a child < 5 or an immunocompromised person, homelessness, etc.

✓ CASE INVESTIGATION

Reporting:

Tuberculosis is an immediately reportable disease. Due to the lengthy period of time required for confirmation of illness, providers and laboratories are urged to report suspect cases of disease (i.e. individuals who are symptomatic and/or have positive AFB smears from sputum or other sources) to public health.

Case definition:

Tuberculosis (2009):

Clinical Description

A chronic bacterial infection caused by *Mycobacterium tuberculosis*, usually characterized pathologically by the formation of granulomas. The most common site of infection is the lung, but other organs may be involved.

Clinical Case Definition

A case that meets **all** the following criteria:

- A positive tuberculin skin test or positive IGRA for *M. tuberculosis* (without this documentation, a provider can still make a diagnosis of ATBD)
- Other signs and symptoms compatible with TB (i.e., abnormal chest radiograph, abnormal chest computerized tomography scan or other chest imaging study, or clinical evidence of current disease)
- Treatment with two or more anti-TB medications
- A completed diagnostic evaluation

Laboratory criteria for diagnosis

- Isolation of *M. tuberculosis* from a clinical specimen^{*} or
- Demonstration of *M. tuberculosis* complex from a clinical specimen by nucleic acid amplification test,[†] ** or
- Demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained or is falsely negative or contaminated.

Case Classification

Confirmed: a case that meets the clinical case definition or is laboratory confirmed.

^{*}Use of rapid identification techniques for *M. tuberculosis* (e.g., DNA probes and mycolic acids high-pressure liquid chromatography performed on a culture from a clinical specimen) are acceptable under this criterion.

[†]Nucleic acid amplification (NAA) tests must be accompanied by culture for mycobacteria species for clinical purposes. A culture isolate of *M. tuberculosis* complex is required for complete drug susceptibility testing and also genotyping. However, for surveillance purposes, CDC will accept results obtained from NAA tests approved by the Food and Drug Administration (FDA) and used according to the approved product labeling on the package insert, or a test produced and validated in accordance with applicable FDA and Clinical Laboratory Improvement Amendments (CLIA) regulations.

An NAA should be ordered on any first positive respiratory smear when warranted by epidemiological significance, when isolation decisions are needed quickly, or if critical in determining a treatment plan.

Comment

A case should not be counted twice within any consecutive 12-month period. However, a case occurring in a patient who had previously had verified TB disease should be reported and counted again if more than 12 months have elapsed since the patient completed therapy. A case should also be reported and counted again if the patient was lost to supervision for greater than 12 months and TB disease can be verified again. Mycobacterial diseases other than those caused by *M. tuberculosis* complex should not be counted in tuberculosis morbidity statistics unless there is concurrent tuberculosis.

Criterion	Case Definition	
	Confirmed	
<i>Clinical Presentation</i>	C	C
unexplained weight loss	C	C
night sweats	C	C
fever	C	C
fatigue	C	C
productive cough for > 3 weeks	C	C
hemoptysis	C	C
abnormal chest radiograph consistent with tuberculosis†		O
abnormal chest computerized tomography scan or other chest imaging study consistent with tuberculosis		
treatment with two or more antituberculosis medications		N
completed clinical evaluation with a diagnosis of current, active tuberculosis		N
death certificate lists tuberculosis as a cause of death or a significant condition contributing to death		N
<i>Laboratory Evidence</i>		
positive tuberculin skin test		O
positive interferon gamma release assay for <i>M. tuberculosis</i>		O
isolation of <i>M. tuberculosis</i> from a culture of a clinical specimen*	S	
demonstration of <i>M. tuberculosis</i> using a DNA probe on a culture from a	S	

clinical specimen		
demonstration of <i>M. tuberculosis</i> mycolic acids using high-pressure liquid chromatography on a culture from a clinical specimen	S	
demonstration of <i>M. tuberculosis</i> from a clinical specimen by nucleic acid amplification test**	S	
demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained	S	

Notes:

S = This criterion alone is sufficient to classify a case

N = This criterion in conjunction with all other “N” and any “O” criteria in the same column is required to classify a case

O = At least one of any “O” criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—in conjunction with all other “N” criteria in the same column—is required to report a case.

C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with—tuberculosis, but is not included in the case definition.

†“A patchy or nodular infiltrate in the apical or subapical posterior areas of the upper lobes or the superior segment of a lower lobe is highly suspicious for early chronic tuberculosis, especially if bilateral or associated with cavity formation.” (Fitzgerald and Haas, 2005)

Case Investigation Process:

Investigators should:

- Perform medical record review
- Determine whether case is latent or active (following a positive PPD or IGRA, obtain CXR; following abnormal CXR determined to indicate suspect active disease obtain sputum. If extrapulmonary disease is suspected, obtain sample for AFB, if possible, and CXR)
- Determine whether case is receiving appropriate antibiotic therapy
- Interview the client (TB case interview)
- Identify case contacts
- Perform risk assessment for MTB transmission
- Manage case contacts
- Field investigation

See the Utah Department of Health Tuberculosis Control Manual for further guidance.

Outbreaks:

Definitions for TB outbreak are relative to the local context. Outbreak cases can be distinguished from other cases only when certain associations in time, location, patient characteristics, or *Mycobacterium tuberculosis* attributes (e.g., drug resistance or genotype) become apparent. In low-incidence jurisdictions, any temporal cluster of cases is suspicious for an outbreak. A

working definition for a potential "TB outbreak" is helpful for planning and response and may include any of the following six criteria:

Criteria based on surveillance and epidemiology:

- An increase has occurred above the expected number of TB cases
- During a contact investigation (CI), two or more contacts are identified as having TB disease, regardless of their assigned priority, (i.e., high-, medium-, or low-priority)
- Any two or more cases occurring within one year of each other are discovered to be linked, and the linkage is established outside of a CI (i.e., two patients who received a diagnosis of TB disease outside of a CI are found to work in the same office and only one or neither of the persons was listed as a contact to the other)
- A genotyping cluster leads to discovery of one or more verified transmission links which were missed during a CI within the prior two years

Criteria based on program resources:

- Transmission continues despite adequate control efforts by the TB control program
- CI associated with increased cases requires additional outside help

Identification of case contacts:

The CI is an integral part of the TB Control Program and one of the best ways to find people who have ATBD. The purpose of the investigation is to find contacts who: 1) have ATBD so that they can be treated and further transmission can be stopped; 2) have LTBI so they can be treated; and, 3) are at high risk of developing ATBD once infected and therefore require treatment until LTBI can be excluded. Each local health department is responsible for ensuring that a complete and timely CI is done for tuberculosis cases and for highly suspect sputum AFB smear-positive tuberculosis cases reported in its area.

For specific information relating to contact investigations please refer to:

Centers for Disease Control and Prevention, Guidelines for the investigation of contacts for persons with infectious tuberculosis; recommendations from the National Tuberculosis Controllers Association and CDC, and Guidelines for using the QuantiFERON-TB Gold test for detecting *Mycobacterium tuberculosis* infection, United States. MMWR 2005;54 (No. RR-15).

Skin testing or the use of an FDA-approved IGRA is used for all members of the household and other close contacts. If negative, a repeat test should be done 8-10 weeks after the last exposure to the index case while the case was infectious. Chest X-rays should be obtained for all individuals found to be infected, and for children under age 5 and immunocompromised persons until proven not infected. For children <5 years, if the initial TST is <5 mm, the interval since last exposure is <8 weeks, and TB disease has been excluded by medical examination, window prophylaxis should be initiated and can be discontinued after a second TST 8-10 weeks postexposure is negative. For immunocompromised persons, a full course of treatment for LTBI is recommended after a medical evaluation to exclude TB disease is completed.

Case contact management:

See the [treatment](#) and [chemoprophylaxis](#) sections for more information on treating latent infection.

A decision to test is a decision to treat to completion. In order for a contact investigation to be complete, all eligible contacts must complete therapy. Attention should be focused on treating contacts who are assigned high or medium priority. Priority ranking is determined by the characteristics of individual contacts and the features of the exposure. (See: Centers for Disease Control and Prevention, Guidelines for the investigation of contacts for persons with infectious tuberculosis; recommendations from the National Tuberculosis Controllers Association and CDC, Figures 2, 3, and 4 for guidance on assigning priorities). Contact investigations of persons with AFB smear or culture-positive sputum and cavitary tuberculosis are assigned the highest priority.

✓ REFERENCES

CDC. Tuberculosis 2009 Case Definition. Retrieved from http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/tuberculosis_current.htm 1/10/12

CDC. Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis; Recommendations from the National Tuberculosis Controllers Association and CDC. MMWR 2005;54 (No. RR-15). <http://www.cdc.gov/tb/publications/guidelines/ContactInvestigations.htm>

American Thoracic Society/Centers for Disease Control and Prevention/Infectious Diseases Society of America: Treatment of Tuberculosis
Am J. Respir Crit Care Med
Vol 167. pp 603-662, 2003
<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5211a1.htm>

Control of Communicable Diseases Manual (19th Edition), Heymann, D.L., Ed; 2009.

Principles and Practice of Infectious Disease (6th Edition), Gerald L. Mandell, John E. Bennett, and Raphael Dolin Eds; 2005.

Massachusetts Department of Public Health, Guide to Surveillance, Reporting and Control, 2006.

ARUP Labs; Physician's Guide to Laboratory Test Selection and Interpretation.

Johns Hopkins Point of Care Information Technology.

Utah Department of Health, Tuberculosis Control Program Manual.
[http://www.health.utah.gov/cdc/tbrefugee/resources/Tuberculosis%20Control%20Program%20Manual%20\(April%202010\).pdf](http://www.health.utah.gov/cdc/tbrefugee/resources/Tuberculosis%20Control%20Program%20Manual%20(April%202010).pdf)

CDC. Recommendations for Use of an Isoniazid-Rifapentine Regimen with Direct Observation to Treat Latent *Mycobacterium tuberculosis* Infection. MMWR December 9, 2011 / 60(48);1650-1653. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6048a3.htm?s_cid=mm6048a3_w

CDC. Updated Guidelines for Using Interferon Gamma Release Assays to Detect *Mycobacterium tuberculosis* Infection --- United States, 2010. MMWR June 25, 2010 / 59(RR05);1-25.
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5905a1.htm?s_cid=rr5905a1_e

CDC. Core Curriculum on Tuberculosis: What the Clinician Should Know; 2011.
<http://www.cdc.gov/tb/education/corecurr/index.htm>

Council for State and Territorial Epidemiologists (CSTE) Position statements. Available from URL: <http://www.cste.org/default.asp?page=PositionStatements>

UT-NEDSS Required Fields

(All of the below is needed either for reporting purposes or to document CDC Objectives success)

- Demographics
 - All except primary language, and longitude/latitude
- Clinical
 - Clinical Info: All except onset date or diagnosis date
 - Mortality status
 - Pregnancy status
 - Treatments – *need* initial Rx, start date, and final end date
- Lab
 - Lab, Organism, Test Result, Test Status, Specimen Source, Collection Date, Accession Number (if multiple samples collected on same date)
 - Need initial collections of every test type (i.e. PPD, QFT, AFB, NAAT, CX, CXR, CT, Sens, HIV)
 - Need change of status indicator results (e.g. first neg smears after +, first neg cx, reversion back to +, then back to neg) and end-of-tx results
- Contacts
 - Same as for case in all available tabs
- Encounters - No
- Epi - No
- Reporting
 - *Would like* 'Reporting Agency's name'
- Investigation – TB Gateway Form
 - Demographics – need 'Country of Birth' (if not U.S.-born, need all info except Alien #)
 - Prev TST, BAMT, CXR – need if no current info in Lab section
 - Symptoms – need 'Does the pt have symptoms?'; *would like* onset date(s)
 - Med hx – need 'Does the pt have TB symptoms?', Any chronic illnesses or immune system problems?', HIV info
 - Risk Factors – need all
 - Disposition - No
 - Suspect Active – No
- Investigation – RVCT (see attachment) : To be completed by UDOH. *This is the electronic reporting form to CDC. Thus UDOH needs to collect this info from the LHD, preferably via the UT-NEDSS documentation.
- Administration
 - Need LHD case status